

CLAIMS

I claim:

1. A fin for use in a heat exchanger having coils including tube segments extending through the fin, the fin comprising

5 a corrugated sheet of material having a plurality of major corrugations, each major corrugation comprising a peak or a valley adjacent a peak, each major corrugation having an amplitude of a distance "h" between the centerline of material forming the fin at a tip of a peak or a bottom of a valley and perpendicular to a reference major plane equally bisecting the major corrugations where the peaks join the valleys, each major corrugation having a width of a distance
10 "w" corresponding to the width of a peak or a valley between the intersecting points of the reference major plane with adjacent major corrugations;

a plurality of orifices adapted for insertion of the tube segments;

a collar perpendicular to the reference major plane and extending from the sheet around each of the orifices; and

15 a generally flat area that is generally parallel to or generally coextensive with the reference major plane and that surrounds each collar;

the major corrugations in a region adjacent to the generally flat areas having at least one of first angled walls extending from the peaks to the generally flat areas and second angled walls extending from the valleys to the generally flat areas, the angled walls adapted to create a vortex
20 when air travels over the fin;

the number of major corrugations being about 8 to about 24 per inch (2.54 cm), the amplitude and width of the major corrugations having a relationship such that a ratio of the distance "h" to the distance "w" is about 0.32 to about 0.7.

2. The fin of claim 1 wherein the peaks and valleys have a transverse cross-sectional
25 shape selected from the group consisting of a rounded curve cross-sectional shape, a triangular cross-sectional shape and a trapezoidal cross-sectional shape.

3. The fin of claim 2 wherein the peaks and valleys have a rounded curve transverse cross-sectional shape.

4. The fin of claim 2 wherein the peaks and valleys have a triangular transverse cross-sectional shape.

5 5. The fin of claim 2 wherein the peaks and valleys have a trapezoidal transverse cross-sectional shape.

6. The fin of claim 1, wherein each of the first and second angled walls independently is at an angle of about 20° to about 60° with respect to the reference major plane.

7. The fin of claim 6, wherein each of the first and second angled walls independently is
10 at an angle of about 30° to about 50° with respect to the reference major plane.

8. The fin of claim 7, wherein each of the first and second angled walls is at an angle of about 45° with respect to the reference major plane.

9. The fin of claim 1, wherein the major corrugations have axes parallel to a line of about 60° to about 90° with respect to a vertical line when the fin is vertically oriented.

15 10. The fin of claim 9, wherein the major corrugations have axes parallel to a line of about 90° with respect to a vertical line when the fin is vertically oriented.

11. The fin of claim 9, wherein the major corrugations have axes parallel to a line of about 75° with respect to a vertical line when the fin is vertically oriented.

12. The fin of claim 1, wherein the amplitude and width of the major corrugations have a
20 relationship such that the ratio of the distance "h" to the distance "w" is about 0.4 to about 0.6.

13. The fin of claim 12, wherein the amplitude and width of the major corrugations have a relationship such that the ratio of the distance "h" to the distance "w" is about 0.45 to about 0.55.

14. The fin of claim 1 wherein the number of major corrugations is about 10 to about 16 major corrugations per inch (2.54 cm).

15. The fin of claim 14 wherein the number of major corrugations is about 12 to about 14 major corrugations per inch (2.54 cm).

16. The fin of claim 1, wherein the generally flat area is generally coextensive with the reference major plane.

5 17. The fin of claim 1, wherein the generally flat area is generally parallel to a plane which is generally parallel to the reference major plane.

18. The fin of claim 1, wherein the generally flat area surrounding a collar has a cross-sectional area, the orifice has a cross-sectional area, and the cross-sectional area of the generally flat area is related to the cross-sectional area of the orifice by a ratio of about 1.2 to about 9.0.

10 19. The fin of claim 18, wherein the ratio of the cross-sectional area of the generally flat area to the cross-sectional area of the orifice is about 1.7 to about 3.6.

20. The fin of claim 1, further comprising a drainage area comprising a generally vertical channel, the channel functioning to drain from the fin liquid that may form on the fin when the fin is in a generally vertical orientation.

15 21. The fin of claim 20, wherein the channel is generally vertically aligned with and under at least one of the collars.

22. The fin of claim 21, wherein there are a plurality of the channels, each channel being vertically aligned with and under one of a respective plurality of the collars.

20 23. The fin of claim 1, wherein the major corrugations have minor corrugations along the length of the peaks and valleys, the minor corrugations being in a plane generally parallel to the reference major plane.

24. The fin of claim 23, wherein the minor corrugations have undulating angles with respect to the axes of the major corrugations of about 2° to about 8°.

25 25. The fin of claim 24, wherein the minor corrugations have undulating angles with respect to the axes of the major corrugations of about 4° to about 6°.

26. The fin of claim 23, wherein the minor corrugations along the peaks are in phase with the minor corrugations along the valleys.

27. The fin of claim 23, wherein the minor corrugations along the peaks are out of phase with the minor corrugations along the valleys.

5 28. The fin of claim 23, wherein the minor corrugations along adjacent peaks are out of phase with respect to each other and the minor corrugations along adjacent valleys are out of phase with respect to each other.

10 29. The fin of claim 23, wherein the minor corrugations along adjacent peaks are in phase with each other and the minor corrugations along adjacent valleys are in phase with each other.

30. The fin of claim 1, further comprising a plurality of bumps extending from at least one surface of the peaks and valleys.

31. The fin of claim 1, further comprising a plurality of dimples extending into at least one surface of the peaks and valleys.

15 32. The fin of claim 1, further comprising a plurality of bumps and dimples respectively extending from and into at least one surface of the peaks and valleys.